Dr. R.W. Gerdel: A History of the
Central Sierra Snow Laboratory at Soda Springs, California

Written by Weather Historian Mark McLaughlin
Photos courtesy of the Gerdel Collection

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The Sierra Nevada snowpack is California's most valuable natural resource, and not because of the popularity of winter sports. When all that frozen precipitation melts it supplies more than half of the Golden State's total water supply. The Sierra range occupies only 12 percent of the state's land area, but nearly 70 percent of the state's population relies on its runoff. The Sierra snowpack is a key asset that sustains one of the largest economies in the world by providing high-quality water to millions of people, as well as to industry, recreation, fisheries and farmers.

Father of Snow Surveying

The earliest studies of California's vital mountain snowpack began with Dr. James E. Church, a Michigan native who was hired in 1892 by the University of Nevada in Reno to teach Latin and Greek. Known as the Father of Snow Surveying, Church was ready to return home after he arrived in Reno and watched a man shot in a saloon gunfight die at his feet. Lucky for us he gazed up at Mount Rose, which towers impressively above the city, and decided to stay.

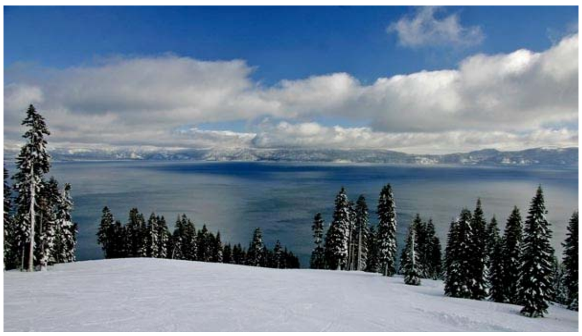
Dr. James Edard Church. Father of Snow Surveying. Photo courtesy of University of Nevada, Special Collections.

Dr. Church is well known for his pioneering work in the science of snow surveying during the early 20th century. In 1905, he established the first Sierra weather observatory atop 10,776-foot-high Mt. Rose (southwest of Reno), and then later developed procedures for measuring the depth of snow and its water equivalent. Church learned that snow is an elastic substance and its depth does not indicate the amount of water in it.

Church got into the streamflow forecasting business by accident. His original research investigating forest influences on mountain snowpacks led him to design the Mt. Rose Snow Sampler, a hollow metal tube that hydrologists thrust plumb into the snowpack to extract a core of snow. The sample core is then weighed on a specially calibrated, portable scale to determine its water content, a simple but effective system that is still used today.

Surveyors using Mount Rose Snow Sampler to measure water content in Sierra snowpack. Circa 1950s.

Dr. Church conducted his first snow surveys in the Sierra Nevada in 1906. He worked closely with Dr. Horace Boardman, a professor of civil engineering at the University of Nevada, to develop the complex mathematical formula by which snow survey measurements are converted into water runoff forecasts. Church really made news in 1911 when he used his snow sampling system to predict the seasonal (spring) rise in Lake Tahoe's water level. Winter storms had dumped nearly 50 feet of snow on the Sierra that winter, and Church's data enabled water managers to avoid damaging floods that spring.



Lake Tahoe in Winter
Photo by Mark McLaughlin

For decades California and Nevada had fought over water rights on the Truckee River and its primary source Lake Tahoe. Early in the 20th century these two states that shared the water in Lake Tahoe were in the midst of a bitter water war. By providing officials with streamflow forecasts to better manage storage in Lake Tahoe, Church's new forecasting tools subdued the conflict. Expanding the snow surveys outside the Tahoe Basin dramatically improved the accuracy of runoff predictions for the Truckee River, Reno's main water source.

Snow Surveys Funded

Although Dr. Church always struggled to get government money to support and expand his snow surveying system, the State of California recognized early on the potential of runoff forecasts to irrigation interests in the Sacramento and San Joaquin Valleys. In 1917, the State Legislature authorized the Dept. of Engineering to engage in snow surveying. In cooperation with Nevada, the department carried on snow surveys until 1923 when funding dried up.

California may have pulled out of the snow surveying business, but other private interests continued sampling the snowpack. California jumped back into the game in 1929 when funds were re-appropriated and 150 snow courses were established throughout the Sierra. The success of the Sierra snow surveys quickly spread to other western states and by 1935 there were at least nine independent and uncorrelated survey networks being conducted by various agencies in the West.

During severe drought in the early 1930s, western farmers and others who relied on water flow demanded better forecasts and the federal government responded in 1935 by creating a federal snow survey and water supply forecasting program within the Department of Agriculture. In 1939, the forecasting program was transferred to the Soil Conservation Service, now known as the Natural Resources Conservation Service. By 1955, there was as many as 2,000 snow course in the West being routinely measured. The NRCS continues to direct a cooperative federal, state, and private snow survey program, working in cooperation with the National Weather Service.

Once government agencies took over the snow surveys, Church began looking for other opportunities to explore. After he retired from teaching at the University of Nevada, Church spent all his free time on snow research. Over the years, he shared his expertise with other countries around the world that relied on mountain snowmelt. He traveled to Greenland, worked with leading Russian scientists, and directed snow-surveying parties into the Himalayas. He also helped Argentina and Switzerland improve their water management systems. Church was a strong advocate of positive international relations and once said, “I went forth in search of science, but I found humanity.”

Pumping water out of Lake Tahoe into Truckee River in 1934 during a severe western drought. Photo courtesy of the Nevada Historical Society.

Western Snow Conference

Church made many important contributions to snow and water management; his earliest studies confirmed the important influence forests play in the conservation of a mountain snowpack. In February 1933 he helped organize the first conference of engineers and scientist interested in snow survey problems. This meeting held at the University of Nevada served as the birthplace for the Western Interstate Snow Survey Conference, the name later changed to Western Snow Conference. These annual conferences continue today, with the stated purpose to provide a forum for individuals and organizations to share scientific, management, and socio-political information on snow and runoff and to advance snow and hydrologic science.

Dr. Church is revered as the “Father of Snow Surveying” but Church didn’t have the equipment or academic training to delve more deeply into the complex physical structure of the snowpack. A major advance for scientific research into the Sierra Nevada snowpack would come in 1945 when U.S. Weather Bureau physicist Dr. Robert W. Gerdel was directed to build the Central Sierra Snow Research Laboratory at Soda Springs (near Donner Pass).

Hydro Challenges

During World War II, government officials recognized the need to improve the management of the country’s precious western water resources. For several years the Army Corps of Engineers had encountered problems determining spillway design for floods, and the Weather Bureau was having trouble meeting its responsibilities for streamflow forecasting.

In 1943, the Weather Bureau partnered with the University of Nevada to establish the Soda Springs Snow Research Project to learn more about the inner workings of the Sierra snowpack. Church had been studying snow in the region for years, but the Weather Bureau sent out R.W. Gerdel, a physicist who had extensive

The Soda Springs Snow Research Project was located just west of Donner Pass in the Central Sierra Nevada. Photo by Mark McLaughlin.

technical training, experience in fieldwork, and the financial resources of the government behind him. Based in Sacramento, Gerdel was in charge of the technical aspects of the Soda Springs research project, with an emphasis on studying the hydro-dynamics of snowmelt and its relationship to runoff. Staff engineers were directed to use the information to help develop flood control structures.

Snow Investigations Program

In 1945, the Army Corps of Engineers and the Weather Bureau joined forces to organize the Cooperative Snow Investigations Research Program (CSIRP), and Dr. Gerdel was appointed Technical Director. Educated in biochemistry and physics, Gerdel had an aptitude for engineering as well as a strong drive for accuracy and professional competence. It was the dawn of a new era for snow science and California water management.

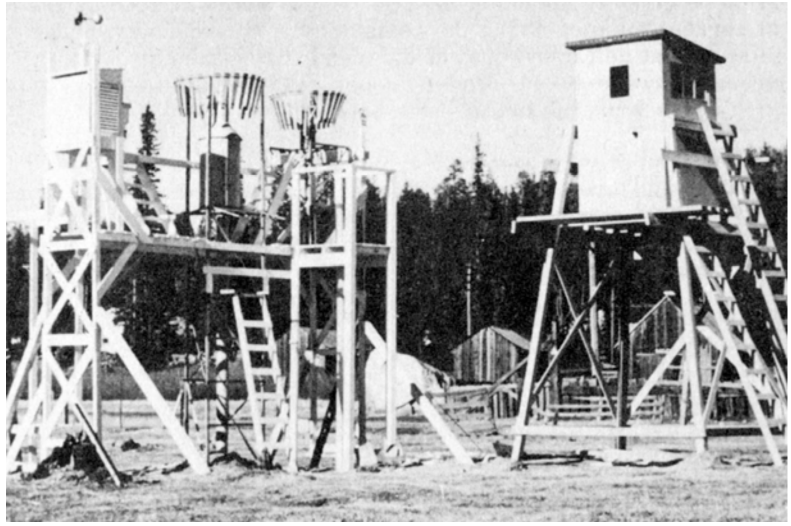
The purpose of the CSIRP was to study snow hydrology problems along with mountain weather and climate. Among the challenges they faced was learning more about the spatial distribution of snowpacks, the physics of snowmelt, and the storage and transit of liquid water in the snowpack. To facilitate the research program, three labs were to be built in western headwater drainage areas where “rugged terrain and severe climate necessitated a large expenditure of effort to meet minimum living requirements and perform periodic visits to the instruments.” Each lab was to be staffed with about six scientists and engineers.

As Technical Director of CSIRP, Gerdel was responsible for locating and building the federal snow laboratories and developing the investigation parameters. Key objectives were to solve design problems for multi-purpose reservoirs and improve runoff forecasting for energy and irrigation supplies, as well as flood control. Gerdel studied various climate zones across the U.S. searching for the best sites that represented deep snow and intense cold. Already familiar with the Donner Pass region, he chose Soda Springs to establish the Central Sierra Snow Laboratory. It’s in a region that receives significant annual snowfall, but is also subject to heavy winter rain.

The Snow Investigations Program wasn’t organized until 1945, but due to his earlier work with the Soda Springs Snow Research Project, Gerdel had installed an instrument array behind the Soda Springs Hotel to study the mountain snowpack. During the winter of 1943-1944, resources were scarce due to the war effort and Gerdel and Church had to share an abandoned gasoline station next to the hotel as a base to conduct their research. These two men were very different in temperament and training, but both would

Soda Springs WX instruments, First instrumentation array (elevated) at Soda Springs. (Soda Springs Research Project, 1943).

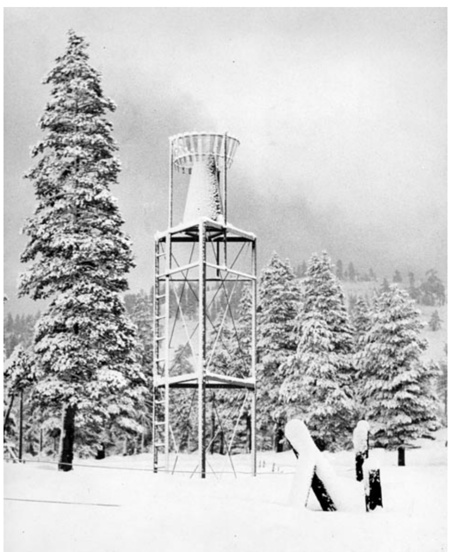
spend most of their lives studying and reveling in the mysteries of snow and ice.



Soda Springs Instrument Platform CSSL. (Soda Springs Research Project, 1943).

Building the Labs

By late 1945 construction was well underway on the federal lab at Soda Springs. Once the two-story research building was completed, Gerdel supervised the installation of its state-of-the-art electronic equipment. A year later, Gerdel was again in charge as crews built the Willamette Basin Laboratory on the Blue River in Oregon's Cascade Mountains, representing a climate of mostly rain with some snow.



WX Gage designed by Dr. Gerdel First Sacramento Type seasonal snowgage and triangular tower, 1943.

Tucker two-pontoon runabout obtained by Dr. Church for use at Soda Springs Research Project. Soda Springs gas station. J.M. Tucker at right with hat. January, 1944.

M-7 First snow survey tractor for CSSL

M-7 Tractor pulling skiers (CSSL staff) on snow survey. Parley Merrill in cab driving with Bill Enloe, towing Dr. Gerdel (left), with Aston Codd and Forrest Rhodes, 1945.

The Upper Glacier National Park in Montana, representing a climate with all snow. The two new labs were directed more toward the elemental measurement of precipitation and runoff without the intense research on complex snowpack physics undertaken at Soda Springs. (The Oregon and Montana labs were shut down in 1950.)

Upper Columbia Snow Lab meteorological facilities under construction, September 1946. Skyland Creek Basin.

Dr. Robert Gerdel. CSSL Instrument Panel. Triple register modifed from Esterline-Angus Recorder. Records velocity and direction of wind and duration of sunshine. Can handle twenty instruments, March 1946.

Dr. Church was not part of the federal Snow Investigations Program, but he continued to operate out of his small facility behind the Soda Springs Hotel. He would spend many more years sharing his knowledge of snow science, but there was no doubt that the arrival of Gerdel and the establishment of the new snow lab represented a transition to more advanced research technologies. The scientists at the lab used the Church-designed snow samplers to measure water content, but to establish definite relationships between physical changes in the snowpack and variations in its microclimate; they also recorded solar radiation, the temperatures of air, snow and soil, wind velocities, and more.

The Climate

The Donner Summit region proved to be a particularly well-suited area to launch the federal snow investigation program. Long-term weather records for locations in western U.S. snow-zones are relatively rare, but Southern Pacific Transportation Company employees had begun measuring snowfall and snowpack at the railroad’s Summit Station at Norden (near Soda Springs) in 1878. Later, weather data from three different National Weather Service sites in the area added to the region’s continuous weather observations.

The Central Sierra Snow Lab is located west of and slightly below the Sierra Nevada crest at an elevation of 6,900 feet. The region is influenced by maritime air masses from the Pacific Ocean and averages about 34 feet of snow during the winter months. The snowpack usually gets established in November and generally lasts through May, averaging from 6 to 16 feet deep. Cold winter storms often bury the area with heavy snow, but winter rain is not uncommon. Temperatures range from minus 4 degrees Fahrenheit to nearly 60 degrees during winter when most of the annual precipitation occurs.

Overcoming Obstacles

Conducting snow science at storm-wracked Donner Pass is a real challenge, but Dr. Gerdel had been overcoming adversity most of his life. Born in St. Louis, Missouri, on October 4, 1901, Robert Gerdel grew up at Escanaba in the snow country of Michigan's Upper Peninsula. When he was 12 years old a doctor had performed a successful tonsillectomy on the Gerdel family's kitchen table, but a bad infection permanently damaged his ear canals and left him deaf. When Gerdel entered high school the principal tried to have him committed to the Michigan School for the Deaf, but Gerdel successfully persuaded the administrator to give him a chance. He learned to lip-read, checked the lecture notes of his fellow students and later graduated with good grades.

Gerdel attended Michigan State College of Agriculture and Applied Science (now Michigan State University) and graduated with a B.S. in Soil Physics and Chemistry. Not only was the coursework challenging, two of his college professors dropped him from their classes due to his lack of hearing. Despite the attitude by his teachers toward his physical handicap, Gerdel went on to earn masters and doctorate degrees from Ohio State University. He then spent nearly two decades in Ohio working as a research physicist and biochemist, studying the effects of water erosion on agricultural land among other projects.

Stellar Staff

CSSL Dinnertime (Left to Right: Dr. Robert Gerdel, Parley Merrill, Bill Enloe and Ashton Codd), 1946.

Once he was assigned to the CSIRP, Gerdel applied his analytical mind and strong work ethic to the establishment of the Central Sierra site, by far the largest and most sophisticated of the three federal labs. The staff at the Soda Springs lab included a physicist (Gerdel), hydrologic engineer, meteorologist and an engineering aid. The hydrologic engineer in charge of the snow courses was Ashton Codd, a University of Nevada graduate and longtime protégé of Dr. Church. Meteorologist observer Bill Enloe had previously spent three winters in Alaska and was well acquainted with mountain weather conditions. Parley Merrill was an experienced engineer who assisted each of his colleagues in their own special projects. All the men were good skiers, except Gerdel who preferred snowshoes.

March Snow Survey. Ashton Codd and Parley Merrill. Snowpack 120 inches deep, 1946.

SECOND FRONT PAGE

The Sacramento Unic

SACRAMENTO, CALIFORNIA, SUNDAY MORNING, MARCH 24, 1946

Four Men Start Seven-Year Vigil Probing Secrets Of Sierra Snows, Hoping to Develop Flood Controls

CSSL Newspaper Headlines, 1946.

CSSL Building, 8 feet plus deep, January 4, 1946.

CSSL Staff on skis. (Left to right: Dr. Gerdel, Ashton Codd, Parley Merrill, Bill Enloe), 1946.

Ashton Codd waxing skis. Codd was a protégé of Dr. Church and University of Nevada-Reno Engineering Professor Horace Boardman, 1946.

Bill Enloe, Senior Observer servicing surface meteorological station, March 1946.

In 1947, two highly acclaimed scientists, Dr. Vincent J. Schaefer and Dr. Irving Langmuir, arrived at the lab to conduct their groundbreaking work in cloud seeding and weather modification. Once research got underway, the team of scientists on Donner Pass began producing a wealth of information about snow physics, snow hydrology, and mountain micrometeorology.

Drop by Drop

Parshall Flume Weir Gate down, 4-foot weir gate, March 1946.

The snow laboratories were considered to be 7 to 8 year pilot projects where hydrology research would be field-tested in real-world conditions. Besides the dramatic weather and deep snow, the lab near Soda Springs was in a perfect location to fulfill one of the develop better methods for estimating rates of streamflow and volumes of runoff in basins. Less than 100 yards from the lab was Castle Creek, which drained a basin of 4.5 square miles. In the summer of 1945, a flume was constructed to measure every drop of water that drained the watershed. By forcing all the water in the creek through a rectangular weir, or opening, the hydrologists were able to determine the exact amount of water draining the Castle Creek watershed.

CSSL Instrument Panel. Micromax recorders register snow and air temperature, incident and refracted radiation. Pictured: Bill Enloe, March 1946.

Snow Data Collection, CSSL, March 1946.

H2O Stage Recorder. Ashton Codd in well house at Parshall Flume (CSSL), March 1946.

Installing Thermohms for measurement of heat diffusivity through snow, March 1946.

Coaxial Thermocouple Pyrhelio-meter. Used to measure the depth to which solar radiation penetrates the snowpack, May 1947.

CSSL Building WX Instruments, 1947.

CSSL Snowpack Density Probes, 1949.

heat from the sun; the wind velocity and direc-

Atomic Byproduct Will Check On Hidden Sierra Snows

By WARREN HOLLOWAY

By the use of a byproduct of the atomic bomb, a group of government employes expect soon to solve the mysteries of snow melt and stream flow in inaccessible areas of the high Sierra Nevada.

Their work is of vital importance to the success of the Central Valleys Project.

A knowledge of how much water will come from the Winter's snow, and from where and when it will come will make possible the maximum use of some $1,000,000,000 worth of water and power development in the central valleys.

Under the supervision of Dr. R. W. Gerdel, a research physicist for the United States Weather Bureau, the men intend to accomplish this by using radioisotopes in an area north of the Donner Summit.

The radioisotope looks like ordinary powdered aluminum contained in a pill bottle, but it really is powdered zinc which has been bombarded in the atomic pile at Oak Ridge, Tenn.

With the atomic byproduct, the men expect soon to be able to sit comfortably in an office, say in Sacramento or San Francisco, and keep a continuous up to the minute record of snow and water conditions simply by tuning radios and

sity vary with the snow melt and water content.

The pulses also can be recorded on a meter or transmitted by radio.

Accredited By AEC

Dr. Gerdel has been accredited by the Atomic Energy Commission to engage in this special research. He has spent years studying the many and complicated related theories. Officially his title is technical supervisor of the Cooperative Snow Investigation. The work is operated jointly by the weather bureau and the army corps of engineers and conducted in three snow laboratories.

They are the Central Sierra Laboratory at Soda Springs, Nevada County; the Upper Columbia Laboratory in Glacier National Park, Mont., and the Willamette Basin Laboratory about 100 mile[s] east of Albany, Ore.

B. Lyle Hansen, also a research physicist, is director of the Sierra laboratory and is primarily responsible for the development of special instruments used in the radioisotope procedure of measuring snow melt.

Others engaged in the research are Harold Keith, a hydrologic engineer of the army engineers who assistant director; Parley Merri[ll] scientific aid from the army en[gineers]

Atomic Byproduct Headline in The Sacramento Union, 1948.

Nuclear Technology

Among the many achievements made at the lab, in 1948 Gerdel and B. Lyle Hansen developed the first nuclear snow gage, which used radioactive material to measure the water content of the snowpack. Hansen was director of the lab and a whiz at designing cutting-edge instruments like the radioisotope snow profiler. During the summer months, Gerdel and Hansen took a small capsule of radioactive Cobalt 60 to a remote location where the material was placed at ground level and a Geiger counter suspended by a cross arm 15 feet above.

As the emitted gamma rays passed through the winter snowpack, collisions with water molecules lowered their energy level which indicated the amount of water in the snow. The Geiger counters were rigged with radio-transmitters so that their measurements could be relayed in real-time to the snow lab, but with the idea that ultimately off-site hydrologists in Sacramento or San Francisco could also receive the signals.

CSSL Radioactive Snowgage. First nuclear snowgage first designed by Dr. Gerdel and B. Lyle Hansen, 1951.

This radio-transmitted system was the first step in establishing an array of remote sensors in the Sierra snowpack, an important breakthrough in snow surveying. Until this point, measurements of the snowpack relied on teams of men to ski or snowshoe into the mountains where weather and avalanches were a significant hazard. In addition, the stomping around to position the snow sampler often disturbed the snow, which increased the chances of error. At the time, Gerdel said, “The radioisotope procedure is expected to make possible the maintenance of a good, continuous inventory of snow more completely and over a much large area than has been possible before.”

The idea of using nuclear material to remotely measure snowpack density was brilliant and scientists have substantially improved the technology. The modern radioactive isotope profiler has the photon source and detector mounted on a pair of parallel vertical tubes topped by a lift mechanism that moves them up and down synchronously through the snowpack. The gage’s principal value lies in its ability to repeatedly measure the same vertical section of snow and thus provide a window into rapid changes in the snowpack such as the rain-on-snow events that sometimes lead to flooding.

Soda Springs Hotel. Highway 40 plow, December 1951.

Dr. Gerdel was Technical Supervisor at the Central Sierra Snow Lab from 1945 until 1950, at which time he was reassigned to a new government agency known as SIPRE, the Snow, Ice and Permafrost Research Establishment. Gerdel would later find himself working at Camp Century, a secret government project where a nuclear powered, subterranean facility that housed more than 200 personnel was carved out of the Greenland Ice Cap, but that is a story for another day.

Snow Pillows & SNOTEL

Deep Snow. Plowing Interstate Highway 40 in January during snow blockade, 1952.

In the decades since Gerdel's team developed the first snow gage that could relay real time measurements via radio waves, scientists have come up with more durable, accurate and sophisticated instruments. But modern hydrologists still use the low-tech Mt. Rose Snow Samplers devised by Church a century ago. Five times each winter teams of surveyors use simple hollow aluminum tubes to extract and weigh core samples in order to determine how much water to expect during the spring runoff. Modern technology has improved the hydrologist's arsenal, but the human surveyors will probably always play an important role.

During the 1960s, the development of automatic sensors for obtaining snowpack water content from remote areas grew rapidly. Pressure pillows (snow pillows) were installed at various locations in the Sierra. Snow pillows are large vinyl bladders filled with a mixture of alcohol and water that are placed on the ground and protected from wild animals by wire mesh. The snow pressure pillow is basically a hydraulic weighing platform that determines water content by recording the weight of the snowpack that accumulates over the bladder.

In the mid 1970s, scientists incorporated meteor burst telemetry technology to relay information from the snow pillows that were usually located at inaccessible, high elevation sites. It's an ingenious system that relays radio signals long distances by bouncing them off the ionized gas trails of meteor dust in the upper atmosphere. This technique allows real-time data transmission between a remote sensor site and a collection station up to 1200 miles away. Currently, data are transmitted by meteor burst to a master station in Boise, Idaho, or Ogden, Utah, and then automatically forwarded to a central computer in Portland, Oregon.

This survey system called SNOTEL (for SNOwpack TELemetry) revolutionized data collection by giving hydrologists daily measurements from a network of more than 600 SNOWTEL sites throughout the West. The remote stations rely on solar power and batteries, and the system can accommodate a variety of other sensors, including wind speed, wind direction, relative humidity, solar radiation, water level, soil moisture, soil temperature and others.

Gamma Ray Detectors

In the 1990s, the Central Sierra Snow Lab began retiring its mechanical snow pillows, which sometimes work erratically and occasionally get disturbed by curious bears, replacing them with more accurate gamma-ray detectors that were developed at Sandia National Laboratories in Livermore, California. It's a high-tech, but straightforward technology where sensors are designed to detect these rays, which bombard the Earth constantly as a product of the cosmic energy of deep space. It works because water absorbs gamma radiation at the same rate whether it is in its liquid or frozen phase. Sensors are placed on the ground so that as snow piles up during the winter months, it can determine the SWE of the snowpack by the difference in voltage between the sensor under the snow and a sensor mounted on a tower above the snowpack. Because cosmic radiation is relatively constant, after a period of time the sensor mounted on the tower can be removed and the one under the snow compared to the established standard.

CSSL 3 meters deep in instrument field.
Photo by Randall Osterhuber, December 1994.

Satellite Technology

The latest tool being utilized to improve snowpack and snowmelt runoff forecasts incorporates satellite technology. Even since the 1940s, government agencies have employed visual surveys and aerial photographs from low flying airplanes to estimate flood threats and improve reservoir management. The contribution of satellite sensing is still limited at this time, but can be particularly helpful when all the ground-based snow telemetry sites have melted out and an estimate of the remaining snowpack at the highest elevations is needed. The use of satellites to augment snow surveys and telemetry stations is more limited in the western U.S. The best results from remote sensing by satellites occur in flat open terrain with clear skies and minimal vegetation, while western U.S. landscapes are timbered, rugged and complex. In the future, satellites will likely play a contributing role in runoff forecasts, but at this time using this technology is expensive and still in the experimental stages.

CSSL sign.
Photo by Mark McLaughlin, 1998.

As technology improves, automated sensors provide accurate data more frequently than can a snow survey team, and at less cost. But hydrologists acknowledge that the manual snow course measurements made by people probably won't be replaced anytime soon.

CSSL Snowpack Study by CSSL Staff.
Water Year, 2004.
Photo by Randall Osterhuber, 2004.

Impact of Snow Lab Science

The winter snow surveys provide crucial information for successfully managing California's extensive reservoir and irrigations systems. In addition to providing reliable conditions for studying the physics of a deep snowpack, research conducted at the Central Sierra Snow Lab was critically important to developing flood control projects and the effective management of California's water supplies. Over the years, water users and voters have invested more than $50 billion (in 2007 dollars) for a coordinated statewide water system.

The research performed at the Soda Springs lab has enabled hydrologists to closely monitor snowfall and snow melt, information that helped establish California's State Water Project and the federal Central Valley Project. Together, these large-scale water transfer projects provide Sacramento River Delta water to 25 million Californians and irrigate millions of acres of farmland. They also directly support more than $400 billion of California's economy.

CSSL Snow pillows and instrument towers.
Photo by Mark McLaughlin, 2008.

Some of the best and brightest have cut their teeth at the Central Sierra Snow Lab. Scientists like Jim Bergman, who ran the lab for 23 years and left in 1989 to become a forest hydrologist for the Tahoe National Forest. Other top-flight, snow lab alumni are Rick Kattelmann, Dave Azuma, Neil Berg, and Bruce McGurk, all of whom have contributed much to our understanding snowpack hydrology.

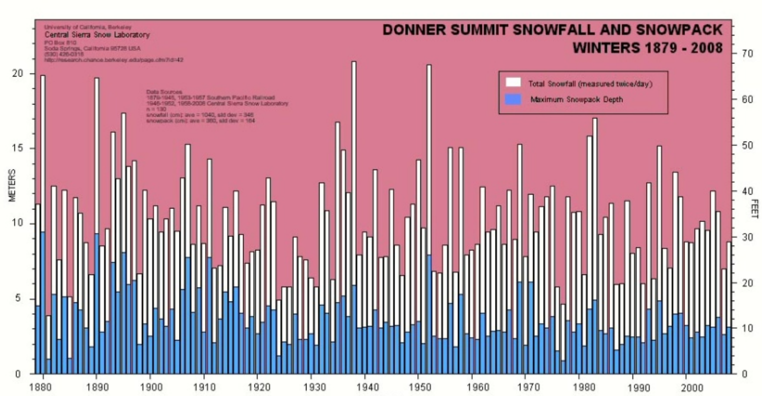
Osterhuber at CSSL Snow Pillows and instrument field. Randall is the current manager (2009) of the Central Sierra Snow Lab. Photo by Mark McLaughlin, 2008.

Alive & Kicking

In the late 1990s, budget cuts forced the Forest Service to close down the lab, but fortunately the University of California came to the rescue. Today (2009) the Central Sierra Snow Lab is managed by Randall Osterhuber who took charge after Bergman's departure. The University of California, Berkeley operates the lab under an agreement with the U.S. Dept. of Agriculture, the Forest Service's Pacific Southwest Research Station, and in cooperation with the California Dept. of Water Resources. To learn more or to schedule a visit to the lab, contact Randall Osterhuber at: http://research.chance.berkeley.edu/cssl/

CSSL wideview. Photo by Mark McLaughlin, 2008.

CSSL Weir Remains, Castle Creek Drainage. Photo by Mark McLaughlin, 2009.



Donner Summit Snowfall and Snowpack Winters 1878-2008 Data Chart. Chart courtesy of CSSL.

Church-Gerdel Snow Science Exhibit at Tahoe City museum. North Lake Tahoe, California, 2009.

Pioneering efforts by Dr. Church, Dr. Gerdel, and others to investigate and improve our scientific understanding of the complexities of the vital Sierra snowpack have laid the groundwork for an extensive snowpack and water management system that has helped nourish and sustain California's growth into an economic giant. The threat of climate change and its inherent challenges to the state's extensive water system make this work more important than ever.

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